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SCHOOL AND SOCIETY

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SCHOOL AND SOCIETY

Volume XV SATURDAY, FEBRUARY 25, 1922 Number 374

PROFESSORIAL SALARIES[1]

A GLANCE at magazine articles appearing in the two decades just previous to the World War shows a uniform tone in those touching upon the subject of salaries in colleges and universities. The overwhelming majority of these articles imply that professorial pay was totally inadequate. An editorial in the *Nation*, December, 1903, undertook to show that college salaries were insufficient to keep the strongest men in the colleges but maintained that a reasonable increase would suffice to hold them because they did not demand luxuries and enjoyed other compensations in addition to the remuneration. This editorial is fairly typical.

Many of the articles imply further a certain lack of public esteem for the professorial calling. George Trumbull Ladd, in the *Forum* in 1902, writes of the "degradation of the professorial office." An article in the *Atlantic Monthly* in May, 1905, set out a list of thirty-one necessary items of expense for a professor with a family and from these the author undertook to show the inadequacy of salaries at that time and the necessity for improvement.

Going back a little further, we find that, in September, 1893, nearly thirty years ago, a writer in the *Forum* gave a statistical review of professors' salaries in 124 American colleges. The author contended that the American professor had too many responsibilities, that too many demands were made upon him and that he required an average salary of $2,000 rather than $1,400 per year as he was receiving at that time. A surprising number of the articles make comparisons between conditions in the United States and Germany which one would hardly dare make to-day for fear of the charge of pro-Germanism. An exceptional writer, here and there, expressed the conviction that salaries were quite adequate and voiced the unusual opinion that the salaries were determined by principles of economics and that every man received what he was worth. For example, under the caption "Confessions of an Obscure Teacher," a writer in the *Atlantic Monthly*, September, 1906, took the very surprising and optimistic view that his salary of a little less than $2,000 was quite sufficient for all his needs. Nevertheless, as we have said, the prevailing feeling all through the years has been that professorial salaries are inadequate. We think that is still the consensus of opinion.

Nor is this opinion confined to America. Listen to the words of the Vice-Chancellor of Cambridge University, England: "They do not pay in this country—nor in any other—their professors or their university presidents enough. . . . Well, it is the old, old story: The cheapest thing going to-day, says the satirist, is education. I pay my clerk, said Crates, four pounds a year, but a philosopher can be hired for about sixpence, and a tutor for three half pence. So to-day, writes Erasmus, a man stands aghast at the thought of paying for his boy's education a sum which would hardly buy a fool or hire a farm-servant.

[1] An address before the Association of American Colleges, January 14, 1922.

Frugality! It is another name for madness."

The following figures compiled by the Chief Clerk in the Bureau of Education and published in Bulletin 1920, No. 20, offer some comparisons between the remuneration of college professors and other workers:

Teachers in Universities and Colleges	Average Salary 1919	Employees in Mechanical Industries	Yearly Earnings, 1919
Public:			
Professors	$3,126	Structural ironworkers	$2,379
Associate professors	2,514	Carpenters	2,081
Assistant professors	2,053	Painters	2,078
Instructors	1,552	Road train employees	1,946
Private:		Machinists	1,777
Professors	2,304	Hod carriers	1,565
Associate professors	2,423	Railroad yard employees	1,421
Assistant professors	1,770	Hostlers and engine-house men	1,204
Instructors	1,205		

It will be seen that, in 1919, associate professors were sightly better paid than structural iron-workers who were better paid than professors in private institutions; that carpenters and painters were paid about the same as assistant professors in state institutions but much better paid than assistant professors in private institutions; that machinists were paid about the same as assistant professors in private institutions; that instructors in state institutions received less than hod carriers and about the same pay as railroad yard employees while instructors in private institutions were paid almost to the dollar the same as hostlers and enginehouse men.

The United States Bureau of Education gathers statistics annually with reference to salaries in state universities and colleges. Some comparisons of pre-war and present salaries may be illuminating and interesting.

SALARIES OF PRESIDENTS

In the collegiate year 1913-14, just previous to the outbreak of the war in Europe, the average salary of the presidents of the state institutions was $5,249. In 1919-20, the average salary of the same men had risen to $6,663, an increase of 26.9 per cent. In neither case are allowances made for residence, which were given in addition to salary. However, the number who were given houses were 48 presidents out of 84 reporting in 1913-14 and 57 out of 88 reporting in 1919-20, or an increase of those having residences given them from 57 per cent. to 65 per cent.

In 1921-22, the present year, we asked the presidents to estimate the value of the rent of the houses given in addition to the salary and to add it to the salary. In this way, we arrived at an average salary for the current year of $8,861 from 74 reporting. This would be an increase of about 69 per cent. over the average for 1913-14, but no estimate was made of houses in that year. In 1920-21, when no houses were considered, the average president's salary was $7,524 or an increase of 43.3 per cent. over 1913-14.

We would be safe in saying that presidents' salaries in state institutions have risen since 1913-14 up to the present in the neighborhood of about 50 per cent.

SALARIES OF FACULTIES

The salaries of faculty members rose more rapidly than did the salaries of presidents in the state institutions. This was

probably due to the fact that those nearest the margin of greatest need in meeting the greatly increased cost of living were attended to first and presidents came in later for increases. This assumption is fortified by the fact that presidents' salaries rose on the average of only 26.9 per cent. in 1919-20 over 1913-14 but in 1920-21 and 1921-22, they rose 43.3 per cent. and about 50 per cent. respectively over 1913-14. Thus the increases were relatively much greater in the last two years. Further, presidents' salaries rose in the state institutions 28 per cent. from 1915-16 to 1920-21, which was considerably less than the average increase for members of the faculty. The salaries of normal school presidents rose from 1916-17 to 1919-20 only 11.8 per cent., whereas all ranks of faculty members were much more favored with increases.

The following figures gathered by the Bureau of Education indicate what has happened in the matter of increases in salaries of the faculties of state universities and colleges between the year 1915-16, the year just previous to the entrance of the United States into the war, and the present collegiate year of 1921-22.

	Average Salary 1915-16	Average Salary 1921-22	Per cent. of Increase
Dean	$3,062	$4,250	38.8
Professor	2,400	3,392	41.3
Associate professor	1,926	2,800	45.4
Assistant professor	1,603	2,300	43.5
Instructor	1,184	1,800	52.0

In citing these figures, it must be noted again, as was the case in computing increases in salaries of presidents, that no allowance was made for houses in 1915-16 whereas houses were taken into consideration in 1921-22. This fact probably makes the estimated increase for deans and to a less extent, for professors a little too high but could hardly affect appreciably those below the rank of professor. But even if the percentages for deans and professors are not too high, the figures show very clearly that the greatest relative increases have come to those in the lower positions who draw the smaller salaries.

SALARIES IN NORMAL SCHOOLS

In this connection, it might be interesting to call attention to some comparisons between salaries in normal schools and state universities and colleges, which were brought out by Dr. George Zook, the bureau's specialist in higher education, in August, 1920. This study showed that, in the year 1919-20, the average annual salary of professors in normal schools was about equal to the average salary of an assistant professor in a state university or a college and about $250 less than the average salary of a full professor in a privately supported university or college. On the other hand, instructors in normal schools received an average salary of $250 per year more than instructors in private universities and colleges and about $150 less than instructors in state universities and colleges.

THOSE LEAVING THE PROFESSION DURING THE WAR PERIOD

Some will be interested to know that effect did the war period have in alluring men from the professor's chair to other callings and to what extent those who made the change were benefitted financially. On March 1, 1920, the Bureau of Education listed 121 instances of college and normal school teachers who, in the few years just preceding, left teaching for other occupations. Anyone desiring the complete list and figures can read them in *School Life* for that date or secure them from the bureau. We shall be content to say here that the average teaching salary of the 121 persons who changed occupa-

tions was $1,826 and the average salaries or earnings of the same 121 persons in their new occupations was $3,647 or an average increase in earning power of 99.7 per cent. over their old positions as teachers. It would be exceedingly difficult to find an equal number of persons who went from other vocations into teaching during those years at an average increase of 100 per cent. over previous remuneration though, of course, one sees that the large increase which those leaving the teaching profession received was due in great part to the general rise which was taking place in the period in the remuneration for all professions and all workers of every kind. At any rate, those figures are a good rebuttal to the one who maintains that all wages are fixed by economic laws and that every one gets just what he is worth and no more or less.

SOME COMPARATIVE PERCENTAGES OF INCREASE IN SALARIES, PRICES AND WAGES SINCE 1913

	1920	1921
Retail food prices	103%	45%
Wholesale food prices	136%	33%
Cost of living	100%	80%
Laborers' weekly wages	130%	——
Artisans' weekly wages	102%	——
Wholesale commodities	143%	51%

These figures, together with those already given on salary increases, reveal conclusively that professorial salaries increased much less during the war period than did the price of food, the cost of living, the wages of artisans or the wages of laborers. The prices of food and the cost of living have fallen considerably in the last two years. During the war period the college professor, like most salaried persons, suffered tremendously but to-day he is perhaps in as good a position economically as he was before the war. If he is not, he soon will be because the cost of living will doubtless continue to fall but there is not likely to be much drop in professorial pay. If the cost of living returns to anything like the pre-war level, though it is not likely to go down to the same level except at some distant time, then we may expect that the college professor will ultimately gain from the war because it is hardly conceivable that the present level of salaries in colleges and universities will be forced down very much, in view of the admitted inadequacy of such salaries in the past.

JOHN J. TIGERT
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WASHINGTON, D. C.

TRAINING THE "FITTEST"

THE attention of college and university faculties during the last year or two has been directed toward the proposition that higher institutions of learning are devoting insufficient effort to developing the minds of the more capable and talented students, that it would be more profitable to spend less time on the great majority of students and so be able to devote it to the talented few, that it is worth while considering whether it is possible to devise methods by which greater consideration may be given the superior students. This suggestion involves so much that it is worth inspection.

One wonders at first whether or not it is a passing fad like the graphing of the grades given students by the individual instructors and their projection upon a screen along with the normal curve,—something which obsessed university registrars and administrators a few years ago and has now past into oblivion; for it is remembered that the pendulum of thought tends to swing from extreme to extreme in educational matters, just as it does in the field of politics, medicine, and theology. It requires more discrimination than most of us are able to exercise to "size up" a movement and determine whether it is a superficial

and so transient phenomenon or one that has abiding qualities.

Let us inspect the proposition before us so that we may be able to pronounce a judgment concerning its worth. Some of its implications and argumentative supports are as follows:

First, the talented are the most fruitful portion of society to educate. This is only conditionally true. It is true that in so far as those social changes necessary to securing progress are brought about by means of the innovating discoveries and inventions of the more able individuals, their selection and training is highly valuable. But such innovations cannot realize progress unless the masses or a considerable fraction of the people are intelligent enough to appreciate them and put them to use. That is to say, the effectiveness of highly trained geniuses and talented is conditioned and determined by the education of the masses, at least by the education of a considerable portion of the population. What would be the fate of a linotype machine invented in Zululand, or of a scientific discovery made among the Bushmen of South Africa?

We may question also the statement that right now the more intensive and highly developed training of the exceptional individual would prove more beneficial and fruitful than the same amount of effort expended on educating the rank and file. Probably the greatest need now is not the development of more geniuses but the higher average mental development of all the people. The experts of all civilized nations have many more times the quantity of science and technique developed which are usable and intended to be applied universally than the people as a whole are capable of putting into practice. The agricultural experts know how to produce three or four times the acre yield of corn and wheat than the farmers of America raise from their fields. Sanitary and social service experts have developed ideals and methods of community organization far in advance of actual conditions. Libraries and museums teem with information which would advance the world a generation or a century could it be put into universal circulation and be made operative in men's lives. The masses of men are the chief concern of society and their higher education is a task second to none in productivity and worth.

Second, in the discussions of the main proposition statements occur to the effect that the average or modal man is not capable of profiting by a college education; therefore it would be better to reduce the number of students and spend more time on developing the exceptional individuals to the nth power. It is maintained by some disputants that college education is more or less of a failure for many or most of those now in college.

But the average man is a man with a normal mind. That means that all of the powers of the mind are present, that perception, memory, association of ideas and the formation of general notions, imagination, and the ability to reason from cause to effect and by comparison are all there. What is there in a college education if clearly and definitely exposited which such a mind, providing the elementary and high schools have done their work efficiently, cannot grasp? Perhaps one had better say that there should be nothing in a college education which such a mind cannot grasp; or, if there is, there is ground for thinking it is there in an inadequate form.

It is true that occasionally individuals of the moronic type get to college; that those improperly trained by lower schools gain admittance; and that a considerable number of students who are normal minded fail to do creditable work in college because of extraneous attractions. But those are

incidents in institutional life and it should be possible to reduce their occurrence. The vast mass of students pass in their studies semester by semester,—a proof either that colleges are inefficient and hypocritical or that the majority of students fairly master what they are given.

Because I am so firmly convinced that our greatest social problem is to educate the masses up to a higher standard of information and culture, to raise the level of intelligence of the people as citizens and voters, I can but regard any suggestion that we narrow our basis of college attendance as a dangerous proposition.

Third, it is also maintained, incidental to realizing the chief contention, that we have not sufficient funds to give all who want it a college education; hence we must narrow the basis and favor the exceptional few. Let us recognize the immensity of the task of financing our higher institutions of learning. But let us also recognize that, so long as we build dreadnoughts, any one of which represents a capital investment several times that of an average university and an annual upkeep expense equal to or greater than that of such average educational institution, we are in no position to allege poverty as an excuse. The fact that people all over the world are willing to put their money into armaments instead of into colleges is the best demonstration of the need of maintaining colleges on the broadest scope for the better instruction of their minds.

A further thought in this connection is the need of widespread realization that education is a paying investment and that the higher and broader the education of a people the greater its fruitfulness in money and service. Wherever we have data covering investments in education and productivity it is found that the productivity of a state or a people is in direct proportion to its educational investment. It is recognized that a university may expand in number of students so fast at times that a real and acute financial problem is raised. But this should only be temporary. In the long run a state evinces its blindness and obtuseness which fails to see that its educational investment is its most paying investment.

Fourth, sometimes in private discussions of the proposal to give more time to the exceptional students a personal note is struck and the exponent intimates that it is so congenial and stimulating to teach the bright pupils and so irritating and depressing to teach the dull. No doubt all teachers experience such a reaction at times. There could be no more delectable task than to have a relatively small group of A and B students to work with, for they would be colleagues and fellow students rather than pupils. There would be no driving or goading required but a delightful discussion day by day of the great ideas, the beauties, the fine things, and the depths of the subject. Truly a college constituted of such students would be a teacher's paradise. Nevertheless, if there is not the stimulation and comfort there is a somewhat equivalent compensation for the teacher who by honest preserving class-room drill day by day sees a large group of indifferently educated and equipped individuals developing out of a condition of confused ideas and stumbling expressions into one of coherence of ideas and clarity of expression. And I am satisfied that if such a teacher could know in future years how many of the students he made work and attain look back to him as one of their real benefactors and founders of their mental life, he would feel amply rewarded. But one's personal preference and predilection as to whom he would teach does not deserve a place in the argument pro and con and so we may dismiss it.

What has thus far been said should not be taken to represent hostility to every good

endeavor to develop the exceptional men and women up to their fullest capacity. Undoubtedly they are often penalized in being restrained to the pace of the mass of more mediocre students, and this situation should be relieved so far as possible. However, it is fortunate that this class of students does not need the urgent compulsion to work that the bulk of students require and may be expected to take advantage of the wider opportunities offered in a university to build themselves up. Such students will not be satisfied with merely doing the amount of reading assigned the class but will explore the field for themselves and browse through the libraries for things of interest. The main thing in developing the exceptional student is to put him in contact with opportunities, not to submerge him with superfluous attention and solicitations; and the university is a place of opportunities.

Whatever may be done legitimately for this class of students should be done; but it should not be done at the expense of the many. It is somewhat questionable whether or not a state university has the right to turn away students in general in order that exceptional students may receive greater care. The masses of citizens in a democracy have a right to demand that their public institutions supported by the taxes of all alike shall not be shut against their children nor in any way abridged to them.

But the general public has no right to object to experiments made in this direction by privately endowed and conducted institutions. If some college wishes to raise its standards so high that only exceptional individuals are able to meet its requirements, it has a perfect right to make the departure; but it would need to be an endowed institution for means and capacity are not always closely associated.

JOHN M. GILLETTE
UNIVERSITY OF NORTH DAKOTA

PREVENTION OF THE LOCKSTEP IN SCHOOLS

THE "lockstep" in public schools of children of widely different mental ability has always been observed and deplored. Only one remedy has been suggested, namely, more individual instruction. There is some reason to believe that this would make the differences greater rather than less. A solution of the problem will depend chiefly on answering two questions (1) *How great* is the difference in intelligence in any given grade or class? (2) Where or when does the lockstep begin? The moment these two questions are adequately answered the lockstep may be *prevented* and this with an economy of time and effort rather than with added expense.

In the process of devising a group intelligence test[1] for kindergarten children and beginners in the first grade and for the past two years in applying the test, we have obtained at least a partial answer to these questions. At every point in devising the test we have verified it by Binet individual tests, so that the standard adopted is mental age. Our experience indicates that this standard alone is practical and readily understood by parents and teachers. There is evidence that one other standard of intelligence gives false values and that the falsity has been overlooked by those who employ it.

The teacher must deal with both classes or groups of children and with individuals. An intelligence test meets the same problems, so we may divide our results into those for groups and those for individuals.

For groups.—For beginners in the first grade in the first week of school how great is the difference in intelligence? Let us compare first the more intelligent and the less intelligent halves of a number of first grade classes, or, to use one word, the superior and inferior halves.

The results are shown in Table I. In this table appear the average chronological ages of beginners in seven schools and their average

[1] Cole and Vincent, Group Intelligence Test for School Entrance, Bureau Measurements and Standards, Emporia, Kansas.

mental ages. The difference in mental ages of beginners in an eighth school are given, but the chronological ages were not given for that school. Hence it is not included in the final averages.

TABLE I

School I— 19 pupils	Av. Chr. Age	Av. Mental Age	
Superior Half	7—1 7-9*	6—7 2-9	
Inferior Half	6—6 1-9	5—4 5-9	B
Difference	7 2-3	1—2 2-3	
School II—34			
Superior Half	6—6 1-7	6—10 2-7	
Inferior Half	6—7 1-2	6— 1 6-7	B
	1 1-3	8 3-7	
School III—16			
Superior Half	6—5 1-2	7— 0 5-8	
Inferior Half	6—4 3-4	5—10 1-2	B
	3-4	1— 2 1-8	
School IV—37			
Superior Half	6—10 8-9	6—11 1-18	
Inferior Half	6— 4 5-6	5—10 5-8	B
	6 1-18	1— 0 7-9	
School V—37			
Superior Half	6—9.1	6—9.7	
Inferior Half	6—2.0	5—6.9	B
	7.1	1—2.8	
School VI—67			
Superior Half		7—1.7	
Inferior Half		5—6.3	B
		1—7.4	
School VII—59			
Superior Half	6—7.6	7— 1.	
Inferior Half	6—2.4	5—10.	C & V
	5.2	1—3	
School VIII—25			
Superior Half	6—11.9	6—4.6	
Inferior Half	6— 4.3	5—1.4	C & V
	7.6	1—3.2	
Final Average For Seven Schools	3.4	1—1.1	

*Read "one year, one and seven-ninths months," and so on throughout the table.

For seven schools the average difference in the chronological age of beginners is only 3.4 months; the average difference in mental age is 1 year, 1.1 months, or more than 1 1-3 school years. In six of these schools the Binet mental ages were obtained within three days of giving the group test. The records of these schools are marked B in the tables. In two schools the mental ages were determined only by the Cole and Vincent group test. These are designated by C. & V. in the table. The difference in mental age has been far greater than the difference in chronological age in every school we have examined. Since there has been no exception to this relation it is probably a general condition. It seems fair to conclude that the lockstep begins in the first year of school and that the difference in intelligence is enormous, even between the better and poorer halves of the class, to say nothing of individuals.

No wonder a Wisconsin school superintendent who has used the test writes me, "I am through with the 'stork method' of entering beginners in classes. The lockstep is the goose-step."

But is the "stork method" used? Look at schools III and IV in the table. These two first grades are in the same building; almost in adjoining rooms. They have been rather carefully equalized in chronological age, but the difference in mental age between their superior and inferior halves is more than a full calendar year. Were they reassigned on the basis of mental age the efficiency of the two classes would be increased by at least 50 per cent. and the burdensome pull of trying to make different abilities accomplish the same work would be decreased by a like amount. Yet the supervisor of this school receives comparatively a princely salary.

I myself used the "stork method" years ago in assigning pupils to classes. But, realizing that I must often be doing an injustice, I urged upon teachers that my assignments were always subject to revision when the teacher's observation of the child's ability justified a change. Imagine my chagrin when told by more experienced principals that their assign-

ments were not subject to change because they were practically infallible, though they too used the "stork method," asking the new pupil first of all his age and making the assignment at or below the grade for that age. As Terman remarks, "The indefensible custom is to grade the newcomer down a little, because forsooth the textbooks he has studied may have differed somewhat from those he is about to take up, or because the school system from which he comes may be looked on as inferior." (M. of I., P. 16). If it be replied that this is merely a practice of western schools the answer is that School VIII of the table is one of the most famous schools for young children on the Atlantic seaboard.

A curiosity of our results emerges in the fact that the difference in mental age is no greater in schools which admit pupils within four months of their sixth birthday than in those which require all entrants to be within four weeks of six years old. This is based on results from two towns and may be modified by further records. In view of this result, such measurements as we have been making may determine how much the kindergarten contributes to mental development.

The smallest difference in mental age between the superior and inferior halves of a primer class is 8 3-7 months, almost a full school year. No one would think of mingling a fifth and a sixth grade in one class, yet something like this is done with beginners and the teacher senses the difference in ability if she can not measure it, for I receive letters from superintendents saying of the tests, "We find they substantiate the teachers' judgment based on the performance of individuals in regular school work, to a marked degree." The test is given on the fifth day of school or as soon as the pupils have learned to carry out very simple commands of the teacher.

How closely the test foretells the pupils' later success in school is shown in the following table derived from our first attempt with it. The table sets forth the correspondence of the group intelligence scores with success at school for one quarter year for 172 of the 244 children who originally submitted to the test.

TABLE II

Number of Pupils	School Mark	Average Score	Average Mental Age (Binet)
1	A +	41	9–1.0
11	A	37	7–3.7
36	A —	27.8	6–9.7
51	B +	25.9	6–8.0
35	B	17.8	6–3.9
19	B —	15.8	6–3.6
12	C +	14.4	5–5.1
2	C	22	6–0.0
2	C —	6.5	4–10.5
3	D +	11.3	5–8.6

Since the test contemplates an interest in individual pupils rather than in statistics, even the small members are not without interest. The pupil (six years and nine months old) with a mental age of nine years, one month should not have been placed in the first grade at all. An inquiry of her parents elicited the information that they did not care to have her accomplish anything in school that year except in the subject of reading. The two intelligent children who attained only C in class work have employed only intelligence, not industry, while the two unintelligent children who received C– have been "lifted" somewhat by the teacher on the basis of something besides actual attainment, probably in the belief that another quarter's work may finally decide their standing. Inquiry of the teachers elicits the information that only those who attain a mark of B may safely be promoted. Therefore, all below six years of mental age and two of just that mental age are failing in their first quarter's work.

Results for individual children.—While averages are convincing, if there is no exception as in Table I., I think intelligence tests, teachers and principals should take the individual child into consideration. The latter two always do so. Their perennial problem is that of the individual child. Let us, therefore, compare extremes of mental age in first primary classes, first the best and poorest nine pupils in one class, then the most able and the least able individuals.

Of 59 school entrants the two ages of the best and poorest nine were as follows:

TABLE III

	Chr. Age	Mental Age
Superior nine	7- 1.4	7-7.0
Inferior nine	5-10.0	5-5.2
	1- 3.4	2-2.8

The lowest mental age of the 59 pupils was four years, eleven months; the highest eight years, three months. The 59 pupils were divided by means of the test into two classes with resulting economy of effort. But it must be admitted that the teacher of the inferior 25 has a much more difficult task than the teacher of the superior 34. Many pupils of her class must remain in the first grade two years, but at least she has known from the first week of school that the fault will not be hers.

The following table gives the extreme differences in mental age of pupils in the same class. Their chronological ages are given for comparison.

TABLE IV

HIGHEST AND LOWEST MENTAL AGES IN THE SAME CLASS

	Chr. Age	Mental Age	
School I—19			
Superior Pupil	8- 1	8-0	
Inferior Pupil	6-10	4-6	B
Difference	1- 3	3-6	
School II—34			
Superior	6-10	7- 4	
Inferior	6- 4	4-10	B
	6	2- 6	
School III—37			
Superior	6-3	8-6	
Inferior	6-3	4-8	B
	0	3-5	
School IV—16			
Superior	6-4	8- 6	
Inferior	6-0	4-10	B
	4	3- 8	
School V—37			
Superior	6-11	8- 6	
Inferior	6- 1	3-10	B
	10	4- 8	
School VI—67			
Superior		8-3	
Inferior		5-3	B
		3-0	
School VII—59			
Superior	7-9	8- 3	
Inferior	7-2	4-11	C & V
	7	3- 4	
School VIII—25			
Superior	6-4	8-3	
Inferior	6-3	3-6	C & V
	1	4-9	
Av. difference in mental age between best and poorest pupil in class		3-7.2	

In the eight schools investigated, therefore, the average difference in mental age between the best and the poorest pupil in the beginning class is 3 years, 7.2 months. The teachers must deal with all the intervening gradations.

The remark is often made by teachers, principals and superintendents that, even if a pupil has superior intelligence, he can not be promoted until he has acquired the information imparted in the preceding years of school. This may be true or it may be the voice of custom or conservatism. It is least true, of course, in the lower grades as less information of a fundamental sort is acquired there than in later school years. For beginners the following example is typical. A year and a half ago the group test revealed three beginners with high mental ages as follows:

TABLE V

Name	Chr. Age	M. A.
T. W.	5-8	8- 6
F. F.	7-3	8- 8
S. P.	6-9	8-10

At the close of the year these three pupils were promoted to the third grade and they are now doing superior work there. The lack of information has proved to be of no detriment whatever.

At the beginning of the present school year one boy was about to be sent home because he would not be six years old even by the mid-

year. Just then the group test was given in that class and he was found to have a mental age of 7 years, 3.7 months. The teacher asked that he remain in school and he has done well. Let us inquire what would have been the result of excluding this child from school. He is the youngest of five children of a widowed mother who is very poor. As soon as the law permits, therefore, he must go to work. His exclusion from school would have meant at least the utter wasting of a year of the life of a bright child. Had the test done no more than discover this child, that alone would have been worth the 35 minutes necessary to give it and the two hours required to score the papers. In the same class was found a repeater 6¼ years old, whose mental age is but 4 years and 2 months. "He does little in school," says the teacher.

There is one curious outcome of the tests that would hardly be expected. Many parents who wish their children to enter school early set down the month of the child's birth, but not the year, as if the omission were an oversight. When the teacher informs the parents that the child is only five years in mental age, the parent asks, "Why, how can you tell his age?" and is very much mystified at the teacher's uncanny power.

Returning now to information gained from groups, a mental test for beginners gives at least a suggestion of a new way to attack the problem of the relative influence of heredity and environment. If we turn to Table I, School VII, we find between the superior and the inferior halves

TABLE VI

Difference of Mental Age	1 year	3 months
Difference of Chronolgical Age	0	5.2
Difference	0	9.8

Is it too much to assume that, with these children who have never been at school at all, the final difference, 9.8 months, represents the hereditary difference in intelligence? In the untutored six years of their life the one group has developed 9.8 months beyond the other, when the difference in chronological age has been excluded. Surely if Stern and Terman may divide the mental by the chronological age to obtain the so-called intelligence quotient, I may subtract the two to get an intelligence difference, for division is merely a short method of subtraction, or better, subtraction is but one step of division. Therefore, if there be an error, it is relatively less in subtracting than in dividing. The I. Q. is widely accepted, whether it is right or wrong, therefore the intelligence difference is already implicitly, if unconsciously, accepted by apostles of the resonant I. Q.

Of course, the reply will be made that all the superior pupils come from superior homes where they have received instruction; a doubtful assumption for some stupid children receive a pathetic amount of devoted instruction at home. But are we sure that there would be less difference among the six-year-old children of an orphan asylum? The experiment should be made there and if the difference is as great as we have found it in beginners at school we should have a method of subjecting an hereditary difference to measurement.

It would also be of interest to see whether this difference increases, decreases, or remains stationary during later years of schooling. Psychologists and observant teachers hold opposite opinions on this question. One eminent psychologist teaches that the teacher contributes nothing positive to the child's mental development, that the school is no more than a device for "sifting out the duffers." Successive measurements of the same children would settle this question, now that we can begin with primer children and collect numerous cases.

Thus far I have given purely experimental results with the one exception just noted. Except for the one subtraction I have performed no arithmetical operation on the experimental results. I have admitted the possibility of error in that because I have found the I. Q. leading to serious error in application. Take the following example:

In 1917 we examined 140 first-grade children by means of the Stanford-Binet individual test. The results are shown in Table VII.

TABLE VII

Average Chi. Age	Average M. A.	Average I. Q.
5–7.3	6–2.2	108.75
6–4.1	6–3.0	98.17
7–2.6	6–4.9	88.80

From the standpoint of mental age this is a fairly homogeneous first grade, if we consider means without deviations. But from the standpoint of intelligence quotients the younger pupils are *apparently* 12 per cent. better than the six-year-olds, and the older children are *apparently* 10 per cent. poorer in intelligence than the six-year-olds. The I. Q. is, thus, a sovereign method of discovering geniuses (who later disappoint their parents' fond hopes) if the children are very young. I have been surprised to find that some schools classify or promote children on the basis of the I. Q. This puts all the younger children in the higher class and the older children in the lower class, and the only factor which operates to do so is the chronological age, the divisor. This would happen if the children were of absolutely the same grade of intelligence. I believe that principals who use the I. Q. basis of classification are quite unaware that they have dropped to chronological age alone as the basis of dividing equally intelligent children into classes. Because of this serious practical error I am hesitant about arithmetically "doctoring" experimental results by even so much as one subtraction. By inquiring of teachers we have

TABLE VIII
VARIATION IN GIVING AND SCORING THE BINET TEST AS COMPARED WITH IDENTICAL SCORES IN THE COLE-VINCENT GROUP TEST

EXPERIENCED EXAMINERS				INEXPERIENCED EXAMINERS			
Excess	No. of Pupils	Score C & V Test	Average Mental Age, Binet	Average Mental Age, Binet	Score C & V Test	No. of Pupils	Excess
	2	7	5–10.0	6– 1.0	7	1	3.0
	2	8	4– 9.0		8	0	3.0
	1	9	6– 0.0	6– 3.0	9	1	6.7
	3	10	5– 7.3	6– 2.0	10	1	
1.0	5	11	5–10.5	5– 9.5	11	2	
	5	12	5– 7.0	6– 5.5	12	2	10.5
2.5	2	13	6– 2.0	5–11.5	13	2	2.5
	6	14	6– 1.0	6– 3.5	14	2	
	5	15	5– 6.4		15	0	
3.6	6	16	5– 6.6	5– 3.0	16	1	
4.4	4	17	6– 3.0	5–10.6	17	3	2.0
	5	18	6– 0.0	6– 2.0	18	3	
3.3	3	19	6– 9.3	6– 6.0	19	3	
	4	20	5–11.0	8– 2.0	20	1	2–3.0
	7	21	6– 4.7	7– 3.0	21	1	10.3
2.1	5	22	6– 3.6	6– 1.5	22	2	
	4	23	6– 8.0	6– 8.6	23	3	0.6
	5	24	6– 4.0	6–10.5	24	4	6.5
	3	25	6– 4.0	6–11.0	25	1	7.0
	8	26	6– 5.0	6–11.3	26	3	6.3
	5	27	6– 7.2	7– 3.0	27	1	7.8
2.3	6	28	6–11.3	6– 9.0	28	2	
.7	5	29	7– 1.0	7– 0.3	29	3	
3.7	6	30	6– 9.3	6– 5.6	30	3	
11.0	5	31	7– 2.0	6– 3.0	31	1	
	5	32	6–11.6	7– 1.2	32	5	1.6
	2	33	6–10.0	7– 2.8	33	6	4.8
	0	34		7– 5.0	34	2	1–1.0
	2	35	6– 6.0	7– 7.0	35	1	
	0	36			36	0	0.5
	2	37	7– 4.0	7– 4.5	37	2	1–5.0
	2	38	6– 2.0	7– 7.0	38	1	
	0	39		6–11.5	39	2	
	0	40		7– 5.0	40	1	1–10.4
	3	41	6– 4.6	8– 3.0	41	1	9.0
	2	43	6–11.0	7– 8.0	43	1	
	0	44			44	0	
	1	45	8– 3.0		45	0	

found the 1917 group to have been fairly homogeneous in ability. Mental age standards meet the later test of the teachers' judgment of ability. I. Q. standards do not, so far as our inquiries have led us. I think that increase in our knowledge of mental tests has been retarded in the United States by our airily throwing over the concept of mental age which Binet required years to discover.

Finally a group test with explicit instructions for its use and interpretations seems to give less variable results in the hands of different examiners. Table VIII probably shows the steady inclination on the part of a teacher to feel that her pupils should score as high as possible on the test. The same variation was shown in her results from the group test but to a slightly less marked degree.

I can imagine a critic saying, "There must be something wrong with your standard of measurement. Your differences are too absurdly great to be found among six-year-old children." Any one who has seen conscientious teachers agonizing over the difficulty of bringing stupid children to even an approximation of the usual standard of achievement will have no such doubts. As one teacher said, "It is like pounding the log with the back of the axe." Again the teacher who has been assigned the inferior half of one of these classes is certain that the difference found by the test is not too great. She is disposed to judge it too small before the close of the year. Teachers have not been unaware of the magnitude of the differences. To meet the practical problem first grade classes have been reduced in some schools to fewer than twenty pupils.

Conclusions.—(1) The law is wrong in assuming that six-year-old children form even an approximately homogeneous intellectual group. There is an average difference of more than a year of mental age between the superior and inferior halves of beginning classes. There was no exception to this relation. The smallest difference found is one school year.

(2) The average difference in mental age between the best and poorest pupil in a primer class averages 3 years, 7.2 months. Primary teachers probably have less homogeneous classes than those of any later school year.

(3) The lockstep surely begins with the first day of school. It can be prevented on the fifth day.

(4) Classes formed on the basis of mental age accomplish far more than others when necessity forces a resort to half-day sessions.

(5) When intelligence is equal, classification by means of the intelligence quotient is classification by means of chronological age. It puts the younger pupils in the higher class.

L. W. COLE

UNIVERSITY OF COLORADO,

EDUCATIONAL EVENTS

"ATHEISM" AND EVOLUTION IN THE COLLEGES

PRESIDENT E. A. BIRGE, of the University of Wisconsin, replied on February 17 to assertions of William J. Bryan, made at Madison a year ago and repeated recently, that he is an "atheist" and an unfit teacher for students because of his acceptance of modern science, including the theory of evolution.

Mr. Bryan had objected to expressions of President Birge that his teachings were causing injury to religion because of his attempt to unite the teaching of the Bible to "discredited scientific hypotheses."

In a letter to the Rev. E. S. Worcester, pastor of the First Congregational Church, of which President Birge has been an officer for forty years, he reasserted expressions made to Mr. Bryan after his speech to students at the university, declaring that he had "never found it necessary to justify religion to science or excuse science to religion." He said:

I have accepted both as equally divine revelations and both as equally wrought into the constitution of the world. Mr. Bryan seemed to dislike especially my objecting to his uniting religion to a "discredited scientific hypothesis." I think that the history of the church gives good ground for my objection. In the fifteenth century people were told that the doctrine of a round world was "atheistic," and a century or so later the Copernican astronomy was called "atheistic." In the nineteenth century evolution, in a like manner, was called "atheistic" by men of whom Mr. Bryan is a belated follower.

Did such teachings help religion in the past, and is there any good reason to think that Mr.

Bryan will succeed where his predecessors have failed dismally during four centuries? Another thing that seems to trouble Mr. Bryan is the fact that I told him that his teachings were "atheistic" rather than the teachings of evolution. I had a real meaning and purpose in thus calling the attention of Mr. Bryan definitely and sharply to the religious harm that may come from his teachings.

The situation in Kentucky, where Mr. Bryan has been similarly active in opposing the teaching of evolutionary principles in schools and colleges, is described in detail in a statement by Arthur M. Miller in *Science*. According to Mr. Miller two bills forbidding the teaching of evolution have been introduced in the Kentucky House and one in the Senate. As recorded in SCHOOL AND SOCIETY a week ago, the Senate committee rejected the original bill and likewise a milder substitute, but the House committee reported favorably a much more drastic measure, providing for a fine of not less than "fifty nor more than five thousand dollars, or confinement in the county jail not less than ten day nor more than twelve months" for any "teacher, principal, superintendent, president or other person connected directly or indirectly with such schools or institutions who shall knowingly teach or permit to be taught Darwinism, Atheism, Agnosticism, or the Theory of Evolution in so far as it pertains to the origin of man." The bill would also cause the charter of the offending institution to be forfeited.

The proposed legislation, Professor Miller explains, is the culmination of an active propaganda carried on in the state for over a year by ministers of several Protestant denominations, notably Dr. J. W. Porter, pastor of one of the Baptist churches in Lexington.

THE PSYCHOLOGICAL CORPORATION

ANNOUNCEMENT was made on February 17 at New York of the establishment of "The Psychological Corporation," an agency for promotion of applied psychology. The objects as stated in the charter of the corporation are as follows:

The objects and powers of this corporation shall be the advancement of psychology and the promotion of the useful applications of psychology. It shall have power to enter into contracts for the execution of psychological work, to render expert services involving the application of psychology to educational, business, administrative and other problems, and to do all other things, not inconsistent with the law under which this corporation is organized, to advance psychology and to promote its useful applications.

The directors of the Psychological Corporation are: James R. Angell, Yale University, New Haven, Conn.; W. V. Bingham, Carnegie Institute of Technology, Pittsburgh, Pa.; J. McKeen Cattell, The Psychological Corporation, New York; Raymond Dodge, Wesleyan University, Middletown, Conn.; S. I. Franz, Government Hospital for the Insane, Washington, D. C.; G. Stanley Hall, Clark University, Worcester, Massachusetts; H. L. Hollingworth, Barnard College, Columbia University, New York, N. Y.; Charles H. Judd, University of Chicago, Chicago, Illinois; William McDougall, Harvard University, Cambridge, Mass.; W. B. Pillsbury, University of Michigan, Ann Arbor, Michigan; Walter Dill Scott, Northwestern University, Chicago, Illinois; C. E. Seashore, University of Iowa, Iowa City, Iowa; Lewis M. Terman, Stanford University, Palo Alto, California; Edward L. Thorndike, Teachers' College, Columbia University, New York, N. Y.; E. B. Titchener, Cornell University, Ithaca, New York; Howard C. Warren, Princeton University, Princeton, New Jersey; Margaret Floy Washburn, Vassar College, Poughkeepsie, N. Y.; John B. Watson, The J. Walter Thompson Co., New York, N. Y.; R. S. Woodworth, Columbia University, New York, N. Y.; Robert M. Yerkes, National Research Council, Washington, D. C.

A statement issued by the president says:

The Psychological Corporation proposes to maintain adequate standards in applied psychology, to assure opportunities and proper payment to those competent to do the work, and to use the profits for psychological research.

Psychology, owing to its recent progress and war service, is attracting wide public attention. This publicity is being used for all sorts of schemes, some of which may seriously injure psychology, not only in its applications but also in its academic standing. It is desirable that the general public shall have some means of learning what psychology can and what it can not do,

and who can and who can not do it. An organized group of psychologists, whose standing is recognized, can exert a useful influence at the present time.

There is much psychological work of economic value that might at present be undertaken to advantage and there are those competent to do the work, but no satisfactory method exists for bringing them together. It is desirable to extend the work and especially to obtain a larger number of able workers and to provide more adequately for those who take up psychology, whether as an independent profession or in universities and other institutions.

The support of research work in any science has always been a difficult problem. In the past such work has been carried forward mostly by those earning their living by teaching. The industrial laboratories are now helping to improve the situation in chemistry, physics and the medical sciences; men are being engaged at relatively large salaries to do research work, often without direct reference to its useful applications. If research in psychology can be supported as a by-product of economic service, its progress will be accelerated in a geometrical ratio.

Perhaps the greatest opportunity is the investigation of problems directly or indirectly of economic value to individuals or groups, of which the work in industrial chemistry of the Mellon Institute of Pittsburgh is an example. Some seventy fellows, mostly younger men, paid an average salary of about $3,000, are engaged in research on problems of use to manufacturing chemists. The Psychological Corporation proposes to use the existing laboratories where the special work can be done to the best advantage and thus to assist the universities and their psychologists.

The problem of selection for general intelligence and for special aptitudes or training is one in which psychology can be of great service at the present time. If standard tests are developed to be used everywhere, both among employees in groups and with individuals seeking employment or advancement, the corporation can give useful employment to many psychologists and probably earn sufficient income to carry on its work, and by research improve and standardize the tests.

The central offices of the Psychological Corporation are in The Grand Central Terminal, New York City. Branches have been established in Washington, Boston, Pittsburgh, Chicago, San Francisco, and other centers. The real work of the corporation will, however, be done by psychologists in existing laboratories.

At the first meeting of the directors the following officers were elected: President, J. McKeen Cattell; First vice-president, Walter Dill Scott; Second vice-president, Lewis M. Terman; Chairman of the board of directors, Edward L. Thorndike; Secretary and Treasurer, Dean R. Brimhall.

C. R. RICHARDS NEW PRESIDENT OF LEHIGH UNIVERSITY

DR. CHARLES RUSS RICHARDS, dean of the College of Engineering of the University of Illinois, has been elected president of Lehigh University to succeed Dr. Henry S. Drinker, who resigned in January, 1920, and is now president-emeritus. Dr. Richards was born at Clarkshill, Indiana, in 1871; he is a descendant, on his mother's side, of the great English engineer, James Watt. He was graduated at Purdue University in 1890, with the degree of B. M. E. A year later he received the M. E. degree from Purdue and, in 1895, the degree of M. M. E. from Cornell University. In 1920 the University of Nebraska conferred on him the degree of Doctor of Science.

Following a year as instructor at the Colorado Agricultural College, Dr. Richards taught from 1892 to 1911 at the University of Nebraska, where he was professor of mechanical engineering, associate dean of the Industrial College, and then dean of the College of Engineering. Since 1911 he has served at the University of Illinois, as professor of mechanical engineering, dean of the College of Engineering and director of the Engineering Experiment Station. Dr. Richards has been engaged in important engineering projects as a consulting engineer, and has also been active in the work of engineering societies.

It is said that, with the coming of its new president, Lehigh will develop as a research center in engineering along lines worked out by Dr. Richards at Illinois. The university now has exceptional testing resources in the John Fritz engineering laboratory and the Coxe mining laboratory, and these will be added to. Full advantage will be taken of the proximity

of the main plant at Bethlehem of the Bethlehem Steel Corporation and of varied industries in the Lehigh Valley.

It is understood that the new president will encourage the development of the College of Business Administration, of which Professor John L. Stewart is the head, and of the College of Arts and Science, of which Professor Philip M. Palmer is the head.

Dr. Richards will take up his work at Lehigh next September. Until then Vice-president N. M. Emery, who has served as acting-president, will continue in charge and he will continue thereafter as vice-president.

COLLEGE ENTRANCE CREDITS IN COMMERCIAL SUBJECTS

THE following resolution, endorsed by the Vocational Educational Association of the Middle West on January 14, has been sent by the Bureau of Education to presidents of colleges and universities and superintendents of schools:

In consideration of the increasing number of students in commercial subjects in secondary schools, and of the increasing demands of industry and commerce for better trained personnel:

The committee appointed at the second Commercial Education Dinner Conference held by the United States Bureau of Education in conjunction with the Vocational Education Association of the Middle West, Wednesday evening, January 11, 1922, recommends transmission by the Commercial Section of the Vocational Education Association of the Middle West to that association for endorsement—

I. A declaration of policy which will best encourage and enable students to continue in higher institutions their preparation for business, thus assuring to industry and commerce a constant and adequate supply of efficient personnel, trained in particular for supervisory and management positions; and to this end that secondary schools and colleges and universities working jointly through customary agencies, effect such a revision and articulation of secondary commercial education with higher education as will achieve this object.

II. That the commercial course in secondary schools include the the three following sequences: English, Social Sciences, and Mathematics and Science; (Commercial Geography may be offered as a part of the Mathematics-Science sequence if not presented in the Social Science group); that a minimum of three units be offered in each of these sequences.[1]

III. And further, that whenever elected at least two units must be taken in any one of the following technique groups: (*a*) Accounting, (*b*) Secretarial, (*c*) Merchandising.[2]

The resolution was drafted by a committee consisting of William Machrach, supervisor of commercial work, Chicago High Schools, chairman; F. C. Blood, of the University of Wisconsin; C. M. Yoder, of the Normal School, Whitewater, Wisconsin; J. A. Book, South Division High School, Milwaukee, and Glen Levin Swiggett, of the United States Bureau of Education. In making public the resolution the Bureau calls attention to the fact that it strengthens the recommendations proceeding from the two conferences held in Los Angeles and San Francisco, July, 1921, by the Bureau's cooperating California business education committee.

COLONY BUILDING IN ALASKA UNDER THE UNITED STATES BUREAU OF EDUCATION

PROGRESS that has been made in Alaska under the Bureau of Education policy, now in effect for a number of years, of organizing colonies for the natives and helping them build up their own industries in close cooperation with the activities of the schools is described in the report just issued by the Bureau on "The Work of the Bureau of Education for the Natives of Alaska."

Within these colonies, it has been found, it is possible to maintain better equipped and more efficient schools than can be provided for smaller villages, and to supervise cooperative stores and industrial enterprises maintained by the natives themselves. The settlements at Hydaburg, Noorvik, and Metlakatla are cited

[1]One unit of Business English may be offered in the English sequence. One unit in United States History and Civics shall be included in the Social Science sequence. Social Science may include: Industrial History, Commercial Geography, Commercial Law, Salesmanship, and Economics. One unit in Commercial Arithmetic may be offered in the Mathematics-Science sequence.

[2]In group (c) or Merchandising, at least one unit must be offered as prerequisite in either Industrial History or Commercial Geography or one-half unit in each.

as conspicuous successes in colony building. Of the Hydaburg colony the Bureau report says:

In a fleet of canoes the people of Klinquan and Howkan migrated to the new site during September, 1911, taking with them their household goods and movable property. Under the leadership of the teacher, a clearing was made in the primeval forest; the schoolhouse was the first building erected; neat log cabins followed, the Bureau of Education aiding in equipping the sawmill to provide lumber for the new village, to which the natives gave the name Hydaburg.

Under the guidance of the Bureau of Education during the following years the Hydaburg people, only a generation removed from savagery, have turned the dense forest into a thriving, well laid out, electrically lighted, self-governing town, with several miles of planked streets, a modern dock and float landing, a sawmill, a cannery building, church, cooperative store, shingle mill, and lumber yard.

The Hydaburg Trading Company was organized in November, 1911, to transact the mercantile business of the settlement and to operate the sawmill. When the books were audited 12 months later, $4,020 had been subscribed in stock. On June 30, 1920, the capital stock of the company was $40,000; merchandise inventoried at $20,000. The sales of lumber from February 1 to June 30, 1920, amounted to $6,000. The company owns a store building worth $10,000, a sawmill valued at $9,500, a cannery building and dock at $6,000, a moving-picture outfit, an automobile truck, and equipment for electric lighting.

In 1911 the par value of a share in the Hydaburg Trading Company was $10. In 1920 the total accumulation on each share, including the stock dividend and the purchase dividend each year, amounted to $244.28. This success is in large measure due to the fact that, through the teacher, the Bureau of Education exercises rigid supervision over the transactions and accounts of the company. An accountant from the Seattle office of the Alaska division of the Bureau of Education makes the annual audit.

TEACHER TRAINING FOR THE CLEVELAND SCHOOLS

POSSIBILITIES for improving the training of those who are teaching or are preparing to teach in the schools of Cleveland, Ohio, are set forth in a report presented early this month by a committee of educators who for some months have been studying the facilities of Cleveland School of Education and Western Reserve University.

The study was carried on under the auspices of The Cleveland Foundation. The committee making it consisted of Dr. C. G. Robinson, professor of education, Western Reserve University; Dean A. L. Suhrie, of the Cleveland School of Education; Dr. William C. Bagley, Teachers' College, Columbia University; Dr. John W. Withers, dean of School of Education, New York University; Dr. George Gailey Chambers, University of Pennsylvania.

In the present affiliation of The Cleveland School of Education and the university the committee notes the groundwork of a system of training which, if developed logically, will give to Cleveland facilities for professional training rivalled by few American cities, according to *School Topics*, the official publication of the Cleveland schools.

Dr. Raymond Moley, director of the Foundation, sees in the report one of the most important forward steps toward consolidation of the city's educational forces, including the public schools, the Cleveland School of Education, Western Reserve University and Case School of Applied Science.

The study of local conditions of teaching and teacher-training was financed by the Foundation; provision for it was made by a joint conference committee comprising university, public school and Foundation officials.

The topics covered in the report are as follows: (1) The Special Problems of the Junior and Senior Teachers' Colleges. (2) The Advanced Education of Elementary School Teachers. (3) The Advanced Preparation of Junior and Senior High School Teachers. (4) Courses for Supervisors and Administrators. (5) Courses for Special Teachers and for Other School Officers and Employees. (6) Standards Governing Admission and Advanced Standing. (7) The Organization of the Faculty of the Senior Teachers' Colleges and the Administration of Courses Leading to Degrees in Education. (8) Experimental, Demonstration and Training Schools. (9) The Teaching-Load in

Relation to the Maintenance of Good Standards of Instruction. (10) Financing the Work of the Seniors Teachers' College. (11) The Contract Between the Cleveland School of Education and Western Reserve University. (12) The Cooperation of Educational Institutions and Civic and Social Agencies of Cleveland in the Education of Teachers. (13) Summary and Conclusion.

EDUCATIONAL NOTES AND NEWS

SUPERINTENDENT E. C. BROOKS of the state department of public instruction of North Carolina has been added to the commission in charge of the educational finance inquiry which is being carried forward under the auspices of the American Council on Education.

THE American Institute of Archeology has appointed Dr. Tenny Frank, professor of Latin in Johns Hopkins University, to be director of the American School of Classical Studies in Rome for the year beginning June 1.

DR. G. W. NASH, for many years president of the state normal school at Bellingham, Washington, has resigned to accept the presidency of the new Educational Foundation of the Congregational Church. He is establishing his office in Chicago.

RUDOLPH BLASCHKA, the artist who, with his father, modelled the famous "glass flowers" in the Botanical Museum at Harvard University, has begun work on a supplementary collection of glass models of grasses and sedges for the university.

DR. JAMES W. HOLLAND, professor of medical chemistry and toxicology and former dean of Jefferson Medical College, Philadelphia, died on February 10. He was 72 years of age.

PROFESSOR ALBERT E. BAILEY, of the department of religious art and archeology in Boston University School of Religious Education, has been appointed educational director of a summer cruise to the Mediterranean, touching at the Holy Land and adjacent countries. He will have charge of a series of lectures on the ancient and modern civilizations to be given on the sites where the events took place. In this work he will be assisted by Professor Charles Foster Keny of Yale University.

THERE are 4,046 members of the American Association of University Professors, according to the official list made public in the January *Bulletin*. The members are distributed among 183 institutions. The largest membership for any one institution is 164 at the Ohio State University. Of the six other universities having membership in excess of one hundred, Princeton has 118, Chicago 116, Michigan 111, California 118, Wisconsin 106, and Harvard 104.

DR WILLIAM ARNOLD SHANKLIN, president of Wesleyan University, has announced the successful conclusion of the university's drive for a $3,000,000 endowment fund. The income from this added endowment will be used to meet a substantial increase in faculty salaries, which was made last year, to provide for an enlarged teaching force, and to meet increased current operating expenses. The trustees are contemplating the erection of a new chemistry laboratory and library. Work on one of these buildings will be commenced early next fall.

In the new *President's Report* just issued by the University of Chicago Press, President Harry Pratt Judson says with reference to the university's finances that 'the traditional policy of keeping the university expenditures within the limits of income has again been maintained during the year just closed. The university has always had, and we trust always will have, a balanced budget. . . . The present income which meets the great expenses of the university is derived to the extent of 46.9 per cent. of this budget from students, 43.7 per cent. from invested funds, and 9.4 per cent. from miscellaneous sources. It is plain then that students pay less than one half the cost of their instruction."

AN open letter to college men of the South urging the study of the facts of the advancement of the negro in education, character, and economic independence, as an antidote to race antagonism, has been made public by the University Race Commission. The importance of interracial cooperation as a practical method

of putting into service the leadership of both races is emphasized.

THE work of the 1922 summer session of Clark University will, as last year, center about the departments of geography and history, though courses will also be offered in social science, psychology, education, English, French, Spanish, and German.

ONE hundred and seventy courses, to be offered by 103 instructors from all parts of the United States and Canada, are announced for the University of California Summer Session in Los Angeles, to be held from July 1 to August 12 at the Southern Branch of the University. On the faculty list appear the names of E. F. Broadus, professor of English at the University of Alberta, Canada; Jose Pijoan, lecturer on Spanish art, Toronto University; Frank Thilly, professor of philosophy, Cornell University; A. L. Guerard, chairman of the department of romance languages, Rice Institute; B. W. De Busk, professor of educational psychology, University of Oregon; J. L. Henderson, professor of secondary education, University of Texas, and many others equally notable from Michigan, Iowa, Pennsylvania, Oregon, Princeton, Columbia, University of Chicago, and the Carnegie Institute of Technology, Pittsburgh.

THE entire main building of the Mankato Teachers College, Minnesota, was destroyed by fire on February 5. The model school building at the south end of the main building was saved. Arrangements have been made to carry on the work for the remainder of the school year. Plans are being worked out to start rebuilding, but is thought likely that it will be at least two years before the college is restored to its full working organization.

IT is expected that the complete report of the National Committee on Mathematical Requirements, now in press, will be ready for distribution in April. It is published under the title "The Reorganization of Mathematics in Secondary Education," and will constitute a volume of about 500 pages. Through the generosity of the General Education Board the National Committee is in a position to distribute large numbers of this report free of charge. It is hoped that the funds available will be sufficient to place a copy of this report in every regularly maintained high school library and also to furnish every individual with a copy free of charge who is sufficiently interested to ask for it. Requests from individuals for this report are now being received. They should be sent to J. W. Young, chairman, Hanover, New Hampshire.

MORE than half of the children in the rural schools of West Virginia are retarded and of these thirty-four per cent. are retarded for more than two years, according to a study completed by the National Child Labor Committee, based on the attendance records of 4,500 children. Of these children only eleven per cent. had been daily attendants; less than two-thirds had attended for as much as seventy-five per cent. of the term; sixteen per cent. had been absent for more than half of the term, and seven per cent. had not been present for even one-quarter of the term. The outstanding conclusions of this study are the facts that attendance in rural schools is very poor and that this is due primarily to the indifference of the parents. The explanation of their indifference is two-fold: first, ignorance of the value of education, and second, the failure of the school to interest the children and to offer a type of education which gains the confidence of the parents.

ALTHOUGH the campaign for consolidation of rural schools in Colorado began but ten years ago, the state now has 167 consolidations. Half of the pupils in the consolidated schools are conveyed back and forth every day in auto busses. Every school morning more than 900 of these busses gather up nearly 15,000 Colorado boys and girls and convey them to schools where the advantages are essentially the same as in the best graded city systems.

THE Bureau of Special Education (for subnormal and delinquent children) of Miami University, which was established through special appropriation by the general assembly of Ohio, will be located in Dayton in June. The bureau will cooperate with the Dayton public

schools in the examination and placement of handicapped children, while the public schools will supply the clinical material and such classes for observation and practice teaching as the bureau may require in connection with the training of special class teachers for handicapped children. The summer session for the training of special class teachers begins on June 19. The courses will be completed in one term or semester. This will enable students to spend one half of the regular school year at the bureau and the other half either in study at the normal school, college or university of their choice, or in teaching in the school system in which they may be employed. Dr. J. E. W. Wallin is director of the bureau.

THE State University of Iowa has begun the publication of the *Philological Quarterly*, a new journal devoted to scholarly investigation in the classical and modern languages and literatures.

THE high school registration of New York City for the second half year is 91,798. This is an increase of 13,511 over the registration on December 31, 1921. The total number of students graduated in January was 4,355. The figures for all the high schools are as follows: DeWitt Clinton, 6,889; Washington Irving, 5,621; Commerce, 4,488; Julia Richman, 4,398; Stuyvesant, 5,636; Wadleigh, 3,759; George Washington, 1,335; Haaren, 871; Evander Childs, 4,214; Morris, 4,741; Theodore Roosevelt, 1,716; Bay Ridge, 2,778; Boys,' 4,851; Bushwick, 4,438; Commercial, 3,909; Eastern District, 3,232; Erasmus Hall, 5,176; Girls', 2,520; Manual Training, 5,867; New Utrecht, 1,089; Girls' Commercial, 1,985; Bryant, 1,728; Far Rockaway, 788; Flushing, 1,562; Jamaica, 1,971; Newtown, 1,990; Richmond Hill, 2,421, and Curtis, 1,883. The Board of Estimate will be asked to allow 85 additional high school teachers to handle this increase in registration. Ninety-one teachers were allowed in the budget for this year, but 176 will be needed.

THE Eyesight Conservation Council of America announces that a nation-wide campaign will be conducted in schools and industries toward eliminating the loss of men and money for which defective vision is held responsible. The council declares that the eye is involved in 11 per cent. of all the permanent industrial accidents of the country and that approximately 25 million persons have defective vision which needs correction.

THE president of the Social Science club, a University of Wisconsin student organization, appeared before the Board of Regents of the University of Wisconsin recently and presented a request from the club that any speaker selected by the club be granted the privileges of the university platform as a matter of right and that no university authority should interfere with the selection of speakers made by this student organization. The request followed the club's agitation for "an open forum" after certain speakers selected by it had not been approved by university authorities. The Regents, in reply, adopted the following resolution: "The Regents have certain duties and responsibilities placed upon them by law. Among these have always been included the ultimate control of university buildings and a measure of responsibility for the speakers who speak from a university platform. The Regents can not, consistently with their duty, divest themselves of this control and this responsibility." A special committee of the student senate, at the same meeting, presented to the Regents a proposal of a student forum board, consisting of six students and one faculty member, to pass upon speakers proposed by various organizations. This proposal was laid over for future consideration.

MILITARY training is now established as an integral organization on the campus of Northwestern University, according to the news letter of the Board of Education of the M. E. Church. Since its inception five years ago it has suffered many set-backs, the most serious one occurring in the Spring of 1919, when the students rebelled at compulsory military training for freshmen and sophomores. In the fall of 1919 freshmen were required to register for either military science or physical education. Major Homer Preston took charge, and at the end of the year over 125 students were en-

rolled in the course. Last fall Major Lewis T. Bryne, of Camp Upton, New York, was appointed head of the "R. O. T. C." (Reserve Officers Training Corps). One hundred and sixty men are at present enlisted, which is the highest figure that has been reached since the War. A novel feature of this organization has been the formation of the Women's Rifle Team, under the direction of Lieutenant Szymanaski. Over two hundred girls make up the "battalion."

SPECIAL CORRESPONDENCE

WORKERS' EDUCATION: SOME EXPERIMENTS AND A CONFERENCE

VARIOUS conferences have taken place within recent years on workers' education. Most of them have been held under the auspices of labor itself or the workers have been largely instrumental in their promotion. A somewhat different conference, however, was held in the Regents Room of the University of the State of New York at Albany last May, attended chiefly by representatives of twelve colleges and universities of the state.

This conference was arranged by the writer, acting under authorization of Dr. Frank B. Gilbert, acting commissioner of education. Its object was largely to enable representatives of colleges and universities of the state, either as a result of their own experience in various types of extension instruction or through the experience of others, to consider various problems relating to workers' education. There was hope also of developing interest and possibly suitable types of educational endeavor under college and university auspices and in cooperation with workers.

Among those who attended was Professor Henry Clay, of the University of Oxford, England, on leave of absence to this country for a lectureship at Amherst College. For several years Professor Clay has been active in the workers' educational movement in England. Commenting upon the similarities and contrasts of the beginnings of the workers' education movement in England and the United States, he suggested that the chief significance of this conference appeared in the fact that the three parties mostly interested were present: namely, representatives of organized labor; representatives of the colleges and universities, and representatives of the official public educational authorities of the state. In this conference, therefore, relationships which may well obtain between higher institutions of learning and the people of their respective communities were plainly marked, as well as the responsibility of public educational agencies themselves in helping provide for educational needs.

Certain representatives of the New York Federation of Labor attended the conference because of their intimate acquaintance with and interest in the workers' educational movement. Their presence was particularly helpful because they brought to representatives of educational institutions a necessary point of view and the attitude of many workers respecting newer educational movements.

This conference was one of the results of investigations, experiments and some pioneer work under the auspices of the University of the State of New York during the preceding six or seven months. Future developments in such efforts depend much upon what financial responsibilities may be assumed by the workers and by the colleges and universities of the state.

A brief account of these tentative efforts in New York State runs something like this: Inquiries were made throughout the state as to the desire of working people for suitable educational opportunities of college and university grade and concerning facilities, means and the willingness or desire of higher institutions of learning to participate. In these inquiries and for the effort which followed, the state department was able to command the services of Mr. William Lamkie, of New York, who is experienced in various types of adult education and who carried on most of the field work. These inquiries and efforts were chiefly made possible by the active interest and final authorization and encouragement of Dr. John H. Finley, then president of the University of the State of New York.

Out of these investigations and as a result of a very brief period of experiment some conclusions, tentatively at least, were reached somewhat as follows:

1. The workers' education movement in America so far is largely a class-conscious movement which, however, may become a general social movement conducive to general as well as sectional social interests through the understanding and cooperation of the workers and the higher institutions of learning.

2. Workers' education must be of university type and grade, with instructors equal in competency, training and experience to regular university instructors but who through special competency, training or experience are peculiarly fitted for educational service among workers.

3. Workers' education is non-vocational in character.

4. Because mature people are primarily concerned in workers' education they naturally expect a responsible share, not only in the promotion and organization of such efforts, but also in the determination, in considerable measure, of subjects of study and character of instruction.

5. Working people are not altogether satisfied about the disinteredness of colleges and universities. Higher institutions of learning frequently are assumed to be antagonistic, largely, to the ideas and ambitions of working people. Unless colleges and universities clearly demonstrate their interest, not only in the regular student body, but also in the people of their respective communities, this attitude will persist.

6. Higher institutions of learning on one hand and workers on the other, while generally desiring to cooperate, are handicapped for various reasons in making suitable efforts for needed cooperation. Intermediary effort is desirable. Provision for such liaison service is needed.

7. Adequate funds for the promotion and organization of suitable types of adult education for workers at least for the present and probably for an indefinite period will not and perhaps cannot be provided by working people themselves. Consequently, some responsibility must be assumed by colleges and universities in serving their respective communities and by the state itself through funds derived from taxes.

8. For an indefinite period much experimental and pioneer work will be needed before acceptable educational effort among workers can be adequately developed. Such, however, will guarantee the character and permanency of types of educational endeavor most needed by industrial workers and most conducive to the real interests of an intelligent democracy.

9. Either a gradual or rapid development of workers' education will depend largely upon the workers themselves.

These and other topics were discussed directly or indirectly at the Albany conference. Numerous problems have arisen in the course of the special effort of the state during recent months, inadequate as this effort has been. Among such problems are: relationship between formal and informal types of educational effort; social and semi-social effort as a part of education for adults; texts and reference books; selection of teachers, subjects and courses of study; local educational committee organization; finance and numerous other items.

It was in December, 1920, that representatives of the New York Federation of Labor, interested in extension of an educational program among the affiliated bodies of the American Federation of Labor in New York State, learned of the desire of the State Department of Education to make inquiries and possibly to undertake some experimental work. An official request was received from Mr. John O'Hanlon, chairman of the educational and recreational bureau, suggesting immediate cooperation. As a result of such cooperation specific efforts were made in several cities including Buffalo, Elmira, Binghamton, Utica, Troy and Albany. These efforts were largely directed through the several central trades assemblies and, wherever possible, through the educational committees of these various trades assemblies. Experience proved practically everywhere that somewhat informal meetings and discussions are essential for the beginning of more substantial effort.

In several places, particularly Elmira and Binghamton, lectures and discussions of a consecutive character were provided in an experimental way. Professor F. L. Patton, of Hamilton College, who gave his efforts to the enterprise in Utica, was conspicuously successful with a series of meetings and discussions on certain problems including money, wages, prices, profits, and similar economic themes.

All of this tentative effort in the extension of an educational program among workers

occurred, unfortunately, at a peculiarly critical period in the recent history of organized labor and at a time when working people have been subjected to a difficult period of transition from a war to a peace economy. In some places, it has been most difficult to secure even a discussion of adult education because other matters of more immediate and fundamental interest were pressing themselves upon public attention. Many labor leaders themselves need to understand the character and purposes of adult education better.

Moreover, colleges and universities have been and likely are to be seriously handicapped in extending educational service among workers because of lack of funds. Increased enrollment in the regular student body also adds to responsibilities, and serious losses from many faculties are just now increasing, not lightening, teaching duties. In justice to the colleges and universities and to members of the faculties, it should be noted that, common impression to the contrary notwithstanding, they do in general wish to be of service and to place all possible facilities and instruction at the disposal of any and all people who are in need of and can appreciate them.

Notwithstanding these problems and other hindrances, there is an increasing appreciation by university and college teachers and others concerned with administrative problems in these institutions, of the claims now made by workers for appropriate recognition and assistance in types of education suitable to meet their peculiar conditions and needs. Possibly parallel or supplementary faculties will be needed; possibly specially equipped instructors will ultimately be provided.

Experience everywhere indicates that those most competent to engage in workers' education as teachers are those trained in the field of social science. Experience in New York state as well as experience in the many labor colleges and in the Workers' Educational Association of England bear eloquent testimony to the interest of workers in subjects pertaining to social relationships; to problems of government; to problems of industrial organization; to matters concerning the welfare of workers; to literature and history and to the many interests relating intimately to intricate modern life.

These are some of the conclusions as a result of these experiments of recent months. Those who have been most intimately related to this effort, however brief and inadequate it has been, are convinced that through suitable forms of cooperation and particularly through mutual understanding and appreciation large advances will be possible in adult education of higher grade under university auspices in cooperation with men and women workers of all grades of life.

To one who is familiar with the development of public education in the United States the significance of these educational movements by working people is readily apparent. The evolution of public education in the United States is marked by efforts of the people to extend conceptions of education and types of education to meet the ever widening needs.

Thus have come about extensions of education downward into the primary grades and upward into the higher grades; the promotion of education through the hand as well as through the eye and ear; the development of suitable types of industrial education and vocational guidance; the development of technical education of higher grade; the increasing financial support of education from public funds derived from taxation; the broadening of curriculum and the raising of teaching standards.

These advances have always and almost everywhere been either preceded by or assisted by the active support of men and women engaged in earning their living in factory, field and stream. Doubtless newer types of education, of which workers' adult education today is typical, are the beginnings of another great educational movement in the United States. Eventually all suitable facilities of education of higher grade will be provided for men and women of the country deprived of educational opportunities in their youth who later on discover that education may extend through life, that cultural ideals and attainments never cease and that continued growth

in the ability to enjoy life in all of its forms and manifestations is as important as earning one's living.

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THE TECHNIQUE OF ARMY TRAINING[1]

Introduction. In a major emergency speed of organization and of training troops is of primary importance. Rapid and thorough training methods are also essential to success with the National Guard, the Organized Reserves and the Citizens Training Military Camps in time of peace. Nothing so stimulates interest in these organizations and makes men enthusiastic in their support as a snappy, progressive schedule that leaves every man with a sense of satisfaction at his personal progress for each day's work.

For these reasons the development of army methods until they achieve the results required with maximum thoroughness in minimum time will be given great weight in the military establishment. This document on Technique of Army Training summarizes the best practice in this matter as developed by war experience and since. Sections I to VII define the essential elements of a sound training program and the procedure for producing the necessary aids to instruction. Section VIII presents the solution of the problem for a single type of technical specialist, the radio operator. This typical illustration outlines the several steps that must be taken and the documents that must be prepared for every phase of army training before firm foundations for a well-coordinated and efficient system will be laid.

Documents do not produce training. They define objectives and assign missions. Educational experience has demonstrated unequivocally that the more clearly the objective is defined and the more specifically the mission is described, the greater the success of instruction. The best marksman can not hit the bullseye unless he sees the target. The best instructors likewise must have their objectives and missions well defined by specifications, standards and job analyses, as herein described, before they can achieve maximum thoroughness of instruction in minimum time.

I. *Personnel specifications.* In order that the man power of the Army may be untilized to its maximum efficiency, not only in time of peace but more especially in time of war, it is essential that each man be assigned to duty where his services will count most. The first step in achieving this objective is the preparation of personnel specifications which define briefly the personnel characteristics, skill and knowledge needed to perform efficiently every type of service required in the Army.

The first important function of personnel specifications is that of an index or catalog by which a unit commander can requisition men needed to complete his organization. They are used in this way when there is available a large number of men of all kinds and the problem is to assign each man quickly where his specific abilities will enable him to render the greatest service. They furnish the standard terminology by means of which personnel officers classify available men in the same catagories used by commanding officers in requisitioning men.

Personnel specifications have a second important function. They define the objective which training for every type of service must achieve. They are the guide in constructing courses of instruction to train raw or partly qualified men to meet the requirements. The personnel characteristics indicate the type of men to select for each type of training, and the skill and knowledge specifications define what the man must be made to master by the instruction.

II. *Minimum specifications.* It is of the utmost importance that the assignment of men to military organizations be so made that the combat branches, on which success in battle primarily depends, secure the requisite amount of intelligence and leadership. Therefore,

[1] From a statement approved for use in the War Department. Prepared under the direction of C. R. Mann, chairman of the Advisory Board, Operations and Training Division, General Staff.

specifications for personnel of the non-combatant branches and for technical specialists of the combatant branches should mention only the indispensable personnel characteristics and the lowest acceptable standards of skill and knowledge essential for proficiency in each grade or rating. If these specifications really contain only the minimum requirements, and if all officers concerned adhere to them accurately, they are a powerful and essential tool in conserving man power. Such specifications are called minimum specifications to distinguish them from specifications that call for degrees of skill and knowledge higher than those actually needed to do the job.

Since personnel specifications also define the objectives of training, they should mention only the essential requirements for proficiency in order to make possible maximum thoroughness of training in minimum time.

Minimum specifications are statements of the essential specific abilities and the lowest acceptable standards for a given grade or rating.

Specific abilities mentioned in minimum specifications are of three kinds, namely:

a. Personal characteristics. Those characteristics of physique, temperament and natural bent essential for the required degree of proficiency.

b. Skill. A list of the things a man must be able to do well in order to qualify for the grade or rating.

c. Knowledge. A list of the things a man must know in order to qualify for the grade or rating.

Standards mentioned in minimum specifications define the required degrees of the various specific abilities.

III. *Tests.* When minimum specifications are used as criteria for selecting and assigning men who already have occupational skill, some means must be provided for quickly and accurately determining what kinds and degrees of specific ability are possessed by the candidate.

The best tests are those by which the candidate's abilities and proficiencies are determined most accurately with the least expenditure of time and energy. To accomplish this the candidate's performance should leave a record that shows obviously his degree of proficiency or deficiency in one or more of the required abilities. Such tests are called objective tests to distinguish them from examinations or interviews, the results of which depend mainly on the personnel or subjective judgment of the examiner. Hence objective tests are devices for determining quickly and without personal bias what kinds and degrees of specific ability are possessed by individuals. Objective tests are of two general kinds,

Aptitude tests, which reveal whether a candidate has the kinds of specific abilities required for a given grade or rating; and

Tests of proficiency, which indicate relative degrees of proficiency for a specific ability or a particular group of specific abilities.

Tests of proficiency make possible a rapid classification of men in their order to excellence with regard to the specific abilities tested. In order to use them as a measure of proficiency, a critical score must be chosen to mark the dividing line between proficiency and deficiency. The selection of the critical score requires giving the test to a number of men whose relative proficiency has been judged by several competent observers over an adequate period of observation. The validity of tests of proficiency thus rests on the judgment of competent observers. Their advantage lies in the fact that they enable an officer to secure quickly a proficiency classification which is as good or better than he could secure in weeks by observation of the men on the job.

This process of determining the critical score that marks the dividing line between proficiency and deficiency for a given grade or rating is called standardization of the test. Hence, *a standardized test* is an objective test in which the critical score required for each grade or rating has been reliably determined.

IV. *Instruction units.* When minimum specifications are used as an objective for training men to qualify for any given grade or rating, green or partially qualified men must be selected to take the work and suitable courses of instruction must be prepared. The essential personal characteristics mentioned in

minimum specifications furnish the guide for selecting men best suited temperamentally for the work. The skill and knowledge specifications define the various kinds of proficiency that must be acquired by training. Experience indicates that the preparation of a course that achieves thoroughness and speed necessitates first, the analysis of the required skills and knowledge into operations or elements each of which is a good unit of instruction; and second, the combination of these instruction units into a practical school program.

The requirements of any grade or rating may be analyzed in an unlimited number of ways. Efficiency of instruction depends in large measure on how the analysis is made. Experience indicates that a logically coherent analysis into what may by analogy be called points, lines and planes, is inexpedient for instruction of the sort of soldier the army actually has to train. For purposes of instruction it is more expedient to break up the requirements for proficiency into fragments, each of which must obviously be mastered in order to become proficient, because it occurs frequently in substantially the same form, either alone or in combination with other similar fragments, in practical work. Such natural fragments of the work required in a grade or rating are called unit operations.

A unit operation is a group of manipulative processes which is large enough to make a good instruction unit and which occurs frequently in substantially the same form, either alone or in combination with other unit-operations in practical work.

Related to the technique of performing the unit-operations there are usually a number of auxiliary facts which a man must know if he is to be really proficient. If these facts are not brought to his attention in the process of doing the unit-operations, they should be presented to him by means of questions in class discussions or by means of required study of reference books. Groups of such auxiliary facts are called information topics. Hence, *an information topic* is a group of related facts, the mastery of which is essential to proficiency in a given grade or rating.

A complete analysis of the requirements of a minimum specification is a list of both the unit operations a candidate must be able to do and the additional information topics he must know. Such a list is called the operations index.

V. *Instructive manuals* are of two kinds, Students' Manuals and Instructors' Guides.

The Students' Manual consists of three essential parts, namely:

1. The Operations Index, an index of the unit operations and information topics into which the requirements for a grade or rating have been analyzed for purposes of instruction.

2. Operation Sheets, which give in natural order directions for performing the unit-operations in the operations index, together with the necessary drawings, illustrations and list of significant questions.

The objective of the operation sheet is to guide the student to rapid acquisition of correct technique in those manipulative operations which are automatisms in a skilled workman. The directions are clear, concise and follow the natural order of procedure established in standard practice. The questions are generally of such nature that they can be answered by observation or a little experimenting while doing the work itself. They do not lead far afield for information not essential to quick mastery of correct manipulative technique.

3. Information Sheets, which contain brief discussions of the information topics mentioned in the operations index, together with the necessary drawings, illustrations, significant questions and references for further study.

The discussions in information sheets are clear, concise and limited to information really essential to proficiency in technique. The questions guide the student to see relationship among the facts learned and ultimately to discover general principles involved.

In some cases it is most expedient to use each unit operation as a separate assignment or job. In other cases it is better to assign men to jobs that involve several of the unit operations. In the latter case it is convenient to use a job assignment sheet, which is a blank

containing spaces for (a) a concise definition of the job; (b) specifications of detail; (c) sketch or drawing; (d) list of unit-operations in the order to be performed; (e) significant questions by the instructor; (f) answers written in by the students.

The Instructors' Guide contains suggestions for instructors concerning such matters as: Equipment and shop set up; securing productive work for classes; prerequisites for admittance to the work; selection of type jobs; organizing productive jobs to cover all unit operations required; circulation of students among jobs; preliminary exercises, drills, information and problems; records, grades, standards and tests.

VI. *Ratings.* The instructor's estimate of the excellence of the students performance is entered on the rating card. The rating card (Form 758, A. G. O. Proficiency Rating in Vocational Training) contains the operations index on the left and a series of ten vertical blank columns on the right. When a student has completed an operation, the instructor draws a horizontal line opposite the operation and of such length as to indicate the student's proficiency. The horizontal lines are gradually lengthened as practice increases proficiency. At the end of the course the rating card shows graphically which of the operations have been done and what degree of proficiency has been attained in each. A brief inspection of the card enables an officer to determine what grade of work the man is qualified to do. (Cf. Special Regulations 121, April 8, 1921).

Standardized tests, when available, are used in instruction as more accurate means of measuring progress and determining proficiency. Such tests are also useful for higher authority in appraising results of instruction and checking proficiency. A standardized test may be constructed to measure proficiency in one operation listed in the operations index or it may be designed to measure proficiency in the course as a whole.

VII. *Tables of required time for training.* After the work described in the preceding five sections has been completed, the complete solution of the problem requires a determination of the average time required for an average green man to qualify under an average instructor for a given grade or rating. In other words, it is necessary to know whether it takes 200 or 400 hours of practice and instruction for a man who possesses the required personal characteristics to qualify as to skill and knowledge.

These data must be secured by experiment with as large a number of men as is possible. It will take several years to make them accurate. It is possible within a few months to set upper and lower limits and to decree that any man who cannot qualify for a given rating in say 200 hours had better be assigned elsewhere. When these data are secured, a training schedule can be constructed which will make it possible to set the date on which any specified number of men properly qualified for any rating can be delivered.

VIII. The radio operator has been selected as an illustration of the procedure described above because this type of specialist is common to all combat arms. The steps in the production of the necessary instruction aids are presented in the following order: (1) Minimum specifications for the third, the second, and the first class operator; (2) operations index (complete for all classes of operator); (3) operation sheets (2 samples from students manual); (4) information sheets (1 sample from students manual); (5) instructors guide (3 sections); (6) tests of proficiency (3 samples).[2]

MINIMUM SPECIFICATIONS FOR RADIO OPERATORS

THIRD CLASS

Personal:

(*a*) Required:

General standards of a private.
Auditory acuity—20/20, Army Test.
Good civil or service record.
Intelligence, 45 points, Army Alpha Test.

(*b*) Desired:

Sense of rhythm.
Good memory span.

[2] For lack of space the minimum specifications (1) only are here reproduced.

Ability to concentrate.

Skill:

Transmit and receive in International Code, fifteen code groups, of five (5) letters each per minute for three (3) minutes, transcribing received signals with pen or pencil in printed characters with a maximum of six (6) erroneous letters.

Make properly the prescribed splices and ties of signal types of wire.

Perform the cycle of operations necessary to effectively obtain and terminate a telephone connection.

Change the batteries in any type of field telephone.

Set up and make the necessary connection for the operation of all radio sets furnished his particular arm.

Make necessary adjustments for the proper tuning and operation of all radio sets furnished his particular arm.

Test and care of storage batteries.

Knowledge:

Working knowledge of :

The different parts of transmitting and receiving apparatus of all radio sets used by his particular arm.

Batteries furnished for radio sets used by his particular arm.

Radio procedure, standard abbreviations and conventional signals.

Standard message blank.

Number of letters or numerals in code groups used in the radio message of his arm.

Attain a minimum of 75 per cent. on the army examination for operators, third class.

SECOND CLASS

Skill:

That required of third class radio operators and the following:

Class Room Test

Transmit and receive in International Code, eighteen (18) code groups of five (5) letters each per minute, for three (3) minutes; transcribing received signals with pen or pencil in printed characters with a maximum of four (4) erroneous letters.

Message and Procedure Test

(On table nets or sets in the field).

Receive two coded tactical messages from a message center, each composed of twenty (20) code groups, of five letters each required to complete the preamble according to the directions written on the message and transmit them to the designated receiving stations and obtain receipt in ten minutes.

Receive two coded tactical messages, each composed of twenty code groups, of five (5) letters each, from a designated transmitting station and prepare them for delivery to message center with proper interpretation of procedure signals.

Code a twenty-word, of five (5) letters each, radio service message in radio service code, correctly in five (5) minutes.

Diagnose trouble and make ordinary repairs on all radio sets used by his particular arm.

Knowledge:

Attain a minimum of 75 per cent. on the army examination for operators, second class.

A working knowledge of :

Different parts of transmitting and receiving apparatus of radio sets issued his arm of the service.

The radio organization of a combat division.

The panel code.

FIRST CLASS

Skill:

That required of a second class radio operator and the following:

Classroom Test

Transmit and receive in International Code, twenty-two (22) code groups, of five (5) letters each per minute, for three (3) minutes, transcribing received signals with pen or typewriter with a maximum of two (2) erroneous letters.

Message Procedure Test

Acting as chief operator on a net control station in a net of three (3) or more stations, required to clear the following traffic:

One (1) message for station outside net,

Two (2) messages for secondary stations in his net,

An important message which a secondary station desires to transmit.

Knowledge:

A working knowledge of:

All sets issued by the Signal Corps within an army.

The radio organization of an army.

Attain an average of 75 per cent. on an army examination for operator, first class.